CME

Ottawa ankle rules

IAN STIELL, MD, MSC, FRCPC

SUMMARY

The Ottawa ankle rule project demonstrated that more than 95% of patients with ankle injuries had radiographic examinations but that 85% of the films showed no fractures. A group of Ottawa emergency physicians developed two rules to identify clinically important fractures of the malleoli and the midfoot. Use of these rules reduced radiographic examinations by 28% for the ankle and 14% for the foot.

RÉSUMÉ

Le projet « Ottawa ankle rule » a démontré que plus de 95% des patients victimes de traumatismes à la cheville subissaient des examens radiologiques mais que 85% des clichés ne révélaient aucune fracture. Un groupe de médecins d'urgence d'Ottawa a élaboré deux règles permettant d'identifier les fractures cliniquement importantes de la malléole et de la partie moyenne du pied. L'utilisation de ces règles a permis de réduire de 28% les examens radiologiques de la cheville et de 14% ceux du pied.

Can Fam Physician 1996;42:478-480.

FAMILY PHYSICIANS, AS MUCH AS any other physician group, are becoming increasingly aware that our provincial health care systems are financially strapped and that our care of patients must be more cost-effective. Foot and ankle x-ray examinations for common ankle injuries are typical examples of "little ticket items," the many small tests and procedures ordered by physicians.

Individually these items are inexpensive, but cumulatively, by sheer volume, they add as much to rising health care costs as expensive but low-volume procedures, such as magnetic resonance imaging scans or open heart surgery. An estimated $500 000 000 is spent annually on ankle radiography in Canada and the United States. Most of these radiographs show no fractures.

Dr Stiell *is a Scientist with the Medical Research Council of Canada Research Personnel Program in Ottawa. He is an Associate Professor in the Division of Emergency Medicine, the Department of Epidemiology and Community Medicine, the Department of Medicine, the Department of Family Medicine, and the Clinical Epidemiology Unit of the University of Ottawa Faculty of Medicine.*

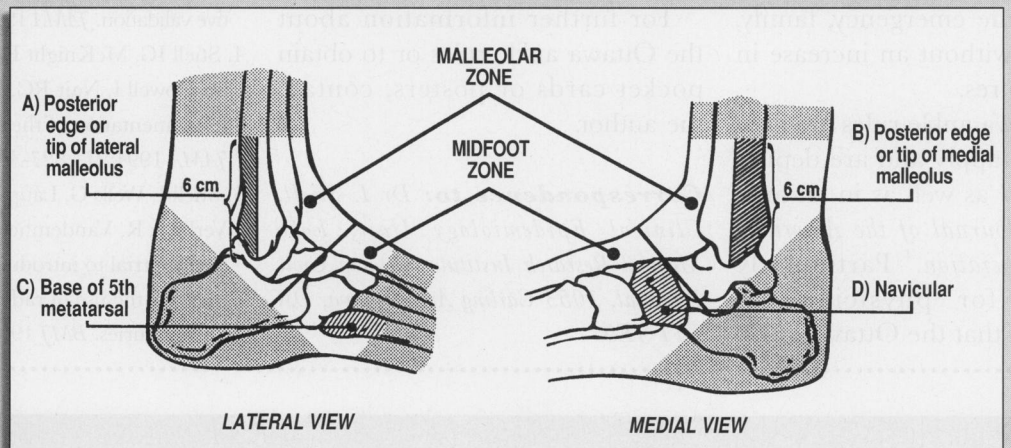
To address this clinical problem, the Ottawa ankle rule project has been conducted in multiple phases over the past 4 years by a group of Ottawa emergency physicians and researchers. In phase 0, we demonstrated that more than 95% of ankle injury patients seen at three Ottawa hospital emergency departments underwent an ankle or foot radiographic series (or both) but that 85% of these x-ray films showed no abnormalities.[1] We also showed that experienced emergency physicians could accurately distinguish fracture from nonfracture cases; unfortunately, these physicians were reluctant to use this clinical skill.

In phase 1, we systematically evaluated 750 emergency department patients for 32 clinical findings and had 100 of these patients examined independently by two physicians to determine which clinical findings were most reliable. Using sophisticated multivariate statistical analyses, as well as a good deal of clinical common sense, we developed two rules to help physicians decide which patients had a negligible risk of fracture and therefore no need of radiography.[2] In phase 2, we prospectively validated

and refined the rules in another 1485 patients and found the rules to be 100% sensitive for identifying clinically important fractures of the malleoli and the midfoot.[3]

In phase 3, we put the Ottawa ankle rules into practice by teaching them to all staff physicians and house staff working in the Ottawa Civic Hospital emergency department over a 5-month period.[4] Compared with baseline levels and compared with a nearby "control" community hospital, we found that radiography for 593 patients was reduced by 28% for ankle radiographs and by 14% for foot radiographs. Patients discharged without radiography spent 36 minutes less in the emergency department, had much lower costs for radiography and physician visits, were equally satisfied with physician care, and were no more likely to have subsequent x-ray examinations than were patients who did undergo radiography in the emergency department. Finally, the Ottawa

Figure 1. **Ottawa ankle rules for the use of radiography in acute ankle injuries**



a) An ankle x-ray series is only required if:

There is any pain in malleolar zone and any of these findings:

i) bone tenderness at A
OR
ii) bone tenderness at B
OR
iii) inability to bear weight both immediately and in ED

b) A foot x-ray series is only required if:

There is any pain in midfoot zone and any of these findings:

i) bone tenderness at C
OR
ii) bone tenderness at D
OR
iii) inability to bear weight both immediately and in ED

Reprinted with permission from Stiell et al.[4] Copyright 1994, American Medical Association, JAMA *1994;271:827-32.*

ankle rules accurately identified all 93 malleolar and midfoot fractures in the 593 patients.

We recently completed the Multicentre Ankle Rule Study, which involved more than 12 000 ankle injury patients in eight Ontario hospitals ranging from small community (Perth, Smiths Falls, Brockville) to large community (Brampton, Nepean) to teaching (Kingston, Toronto) institutions.[5] The study showed large reductions in ankle x-ray films in all hospitals and by all types of physicians (full-time emergency, family, house staff) without an increase in missed fractures.

The Ottawa ankle rules are easy to learn and apply and are depicted in *Figure 1* as well as in an article in the *Journal of the American Medical Association*.[4] Particularly important for physicians to remember is that the Ottawa ankle rules have not been tested in children and are not meant to override clinical judgment. The rules should be used with caution if patient assessment is unreliable (eg, intoxication), there are other painful injuries, the patient has diminished peripheral sensation, or if gross swelling makes palpation of bone tenderness impossible. Physicians must remember to palpate the entire distal 6 cm of the lateral malleolus and must not forget the importance of medial malleolar tenderness.

For further information about the Ottawa ankle rules or to obtain pocket cards or posters, contact the author. ■

Correspondence to: *Dr I. Stiell, Clinical Epidemiology Unit, Loeb Medical Research Institute, Ottawa Civic Hospital, 1053 Carling Ave, Ottawa, ON K1Y 4E9*

References

1. Stiell IG, McDowell I, Nair RC, Aeta H, Greenberg GH, McKnight RD, et al. Use of radiography in acute ankle injuries: physicians' attitudes and practice. *Can Med Assoc J* 1992;147:1671-8.
2. Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Worthington JR. A study to develop clinical decision rules for the use of radiography in acute ankle injuries. *Ann Emerg Med* 1992;21:384-90.
3. Stiell IG, Greenberg GH, McKnight RD, Nair RC, McDowell I, Reardon M, et al. Decision rules for the use of radiography in acute ankle injuries: refinement and prospective validation. *JAMA* 1993;269:1127-32.
4. Stiell IG, McKnight RD, Greenberg GH, McDowell I, Nair RC, Wells GA, et al. Implementation of the Ottawa ankle rules. *JAMA* 1994;271:827-32.
5. Stiell I, Wells G, Laupacis A, Brison R, Verbeek R, Vandemheen K, et al. A multicentre trial to introduce clinical decision rules for the use of radiography in acute ankle injuries. *BMJ* 1995;311:594-7.

FOR PRESCRIBING INFORMATION SEE PAGE 541 ➔